Title: Self-Contained Keyless Entry System To Prevent Lockout From Restricted-Access Spaces
Filing Date: February 6, 2004
Serial No.: Not Yet Assigned
Inventor(s): Alexandropoulos
Docket No.: GEE-001.01
Express Mail Label No. EV 327714865 US

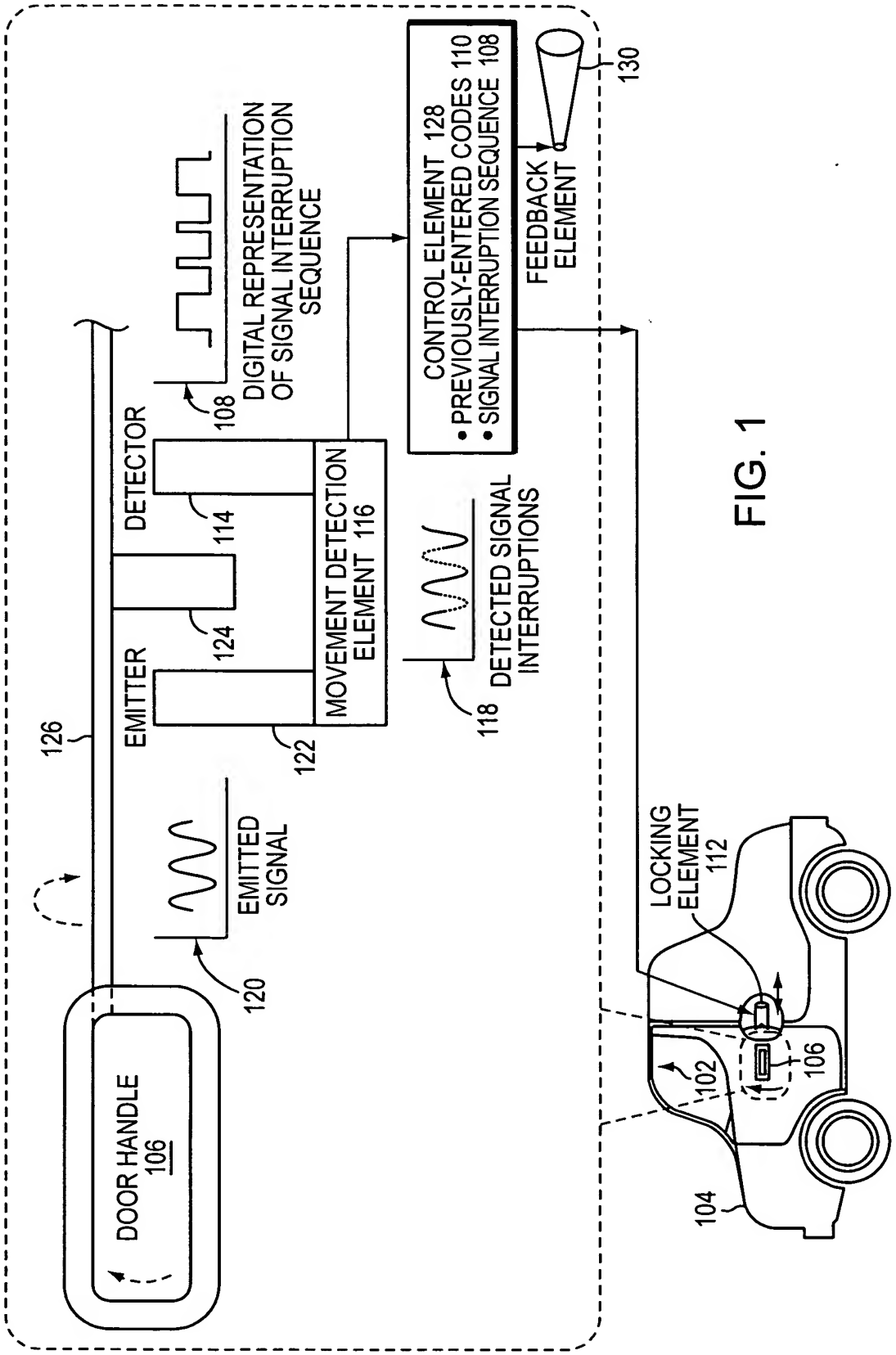

FIG. 1

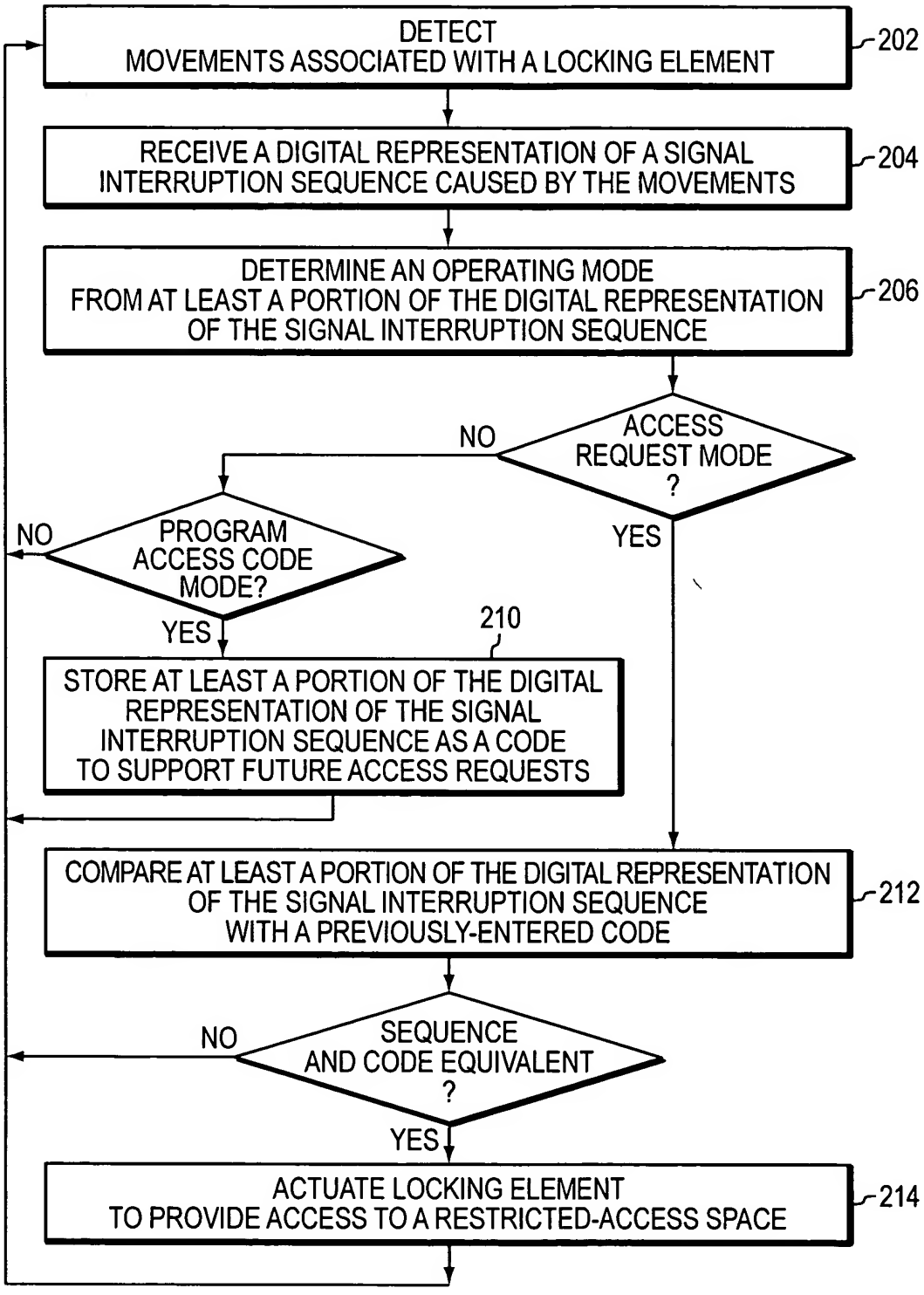
DETECT MOVEMENTS ASSOCIATED WITH A LOCKING ELEMENT
202
RECEIVE A DIGITAL REPRESENTATION OF A SIGNAL INTERRUPTION SEQUENCE CAUSED BY THE MOVEMENTS
204
DETERMINE AN OPERATING MODE FROM AT LEAST A PORTION OF THE DIGITAL REPRESENTATION OF THE SIGNAL INTERRUPTION SEQUENCE
206
ACCESS REQUEST MODE ?
NO
YES
PROGRAM ACCESS CODE MODE?
NO
YES
210
STORE AT LEAST A PORTION OF THE DIGITAL REPRESENTATION OF THE SIGNAL INTERRUPTION SEQUENCE AS A CODE TO SUPPORT FUTURE ACCESS REQUESTS
COMPARE AT LEAST A PORTION OF THE DIGITAL REPRESENTATION OF THE SIGNAL INTERRUPTION SEQUENCE WITH A PREVIOUSLY-ENTERED CODE
212
SEQUENCE AND CODE EQUIVALENT ?
NO
YES
ACTUATE LOCKING ELEMENT TO PROVIDE ACCESS TO A RESTRICTED-ACCESS SPACE
214

FIG. 2

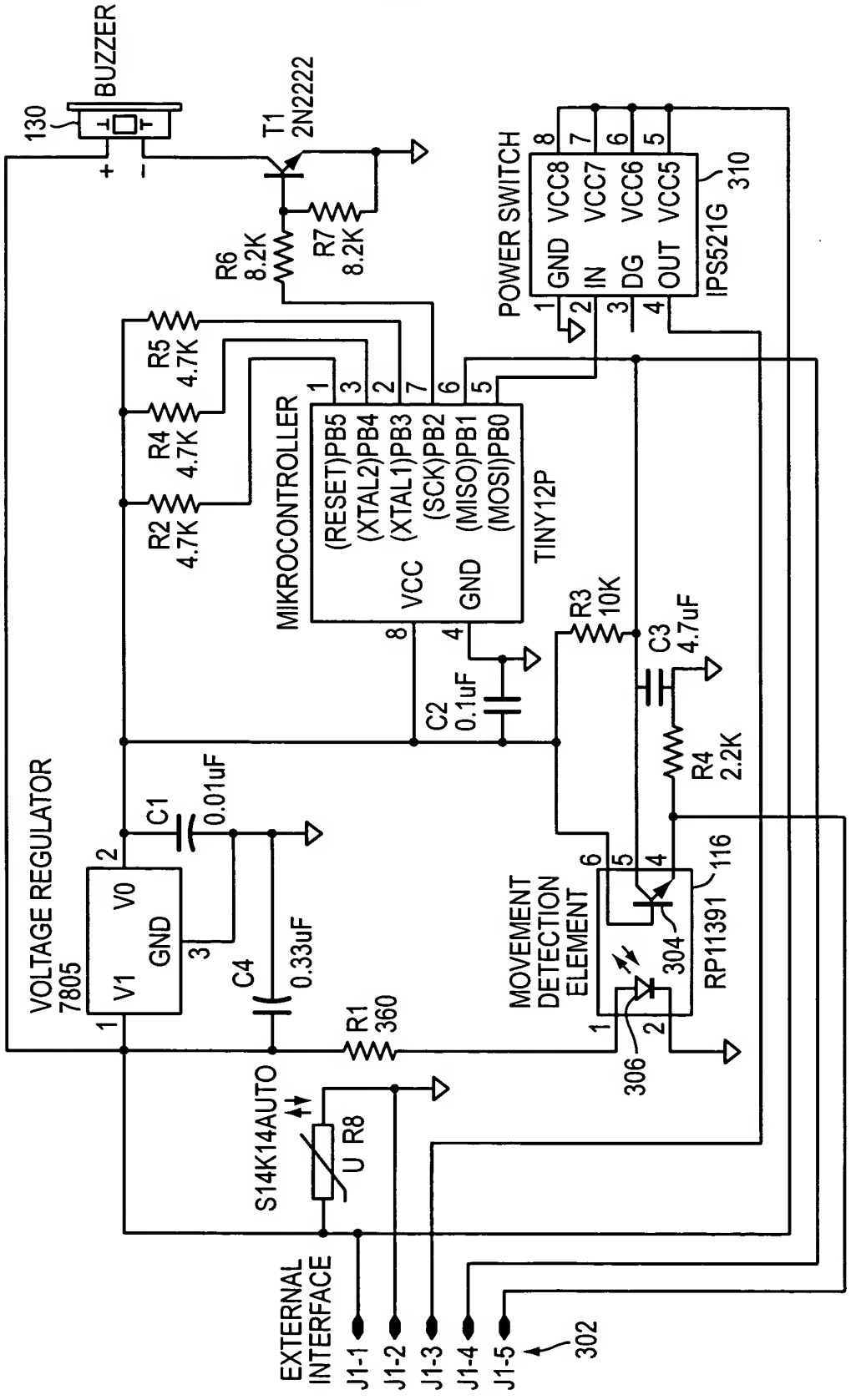
BUZZER
130
T1
2N2222
R6
8.2K
R7
8.2K
POWER SWITCH
GND
IN
DG
OUT
VCC8
VCC7
VCC6
VCC5
IPS521G
310
R5
4.7K
R4
4.7K
R2
4.7K
MIKROCONTROLLER
(RESET)PB5
(XTAL2)PB4
(XTAL1)PB3
(SCK)PB2
(MISO)PB1
(MOSI)PB0
VCC
GND
TINY12P
R3
10K
C3
4.7uF
C2
0.1uF
R4
2.2K
VOLTAGE REGULATOR
7805
V0
V1
GND
C1
0.01uF
C4
0.33uF
R1
360
MOVEMENT
DETECTION
ELEMENT
RP11391
116
304
306
S14K14AUTO
U R8
EXTERNAL
INTERFACE
J1-1
J1-2
J1-3
J1-4
J1-5
302

FIG. 3

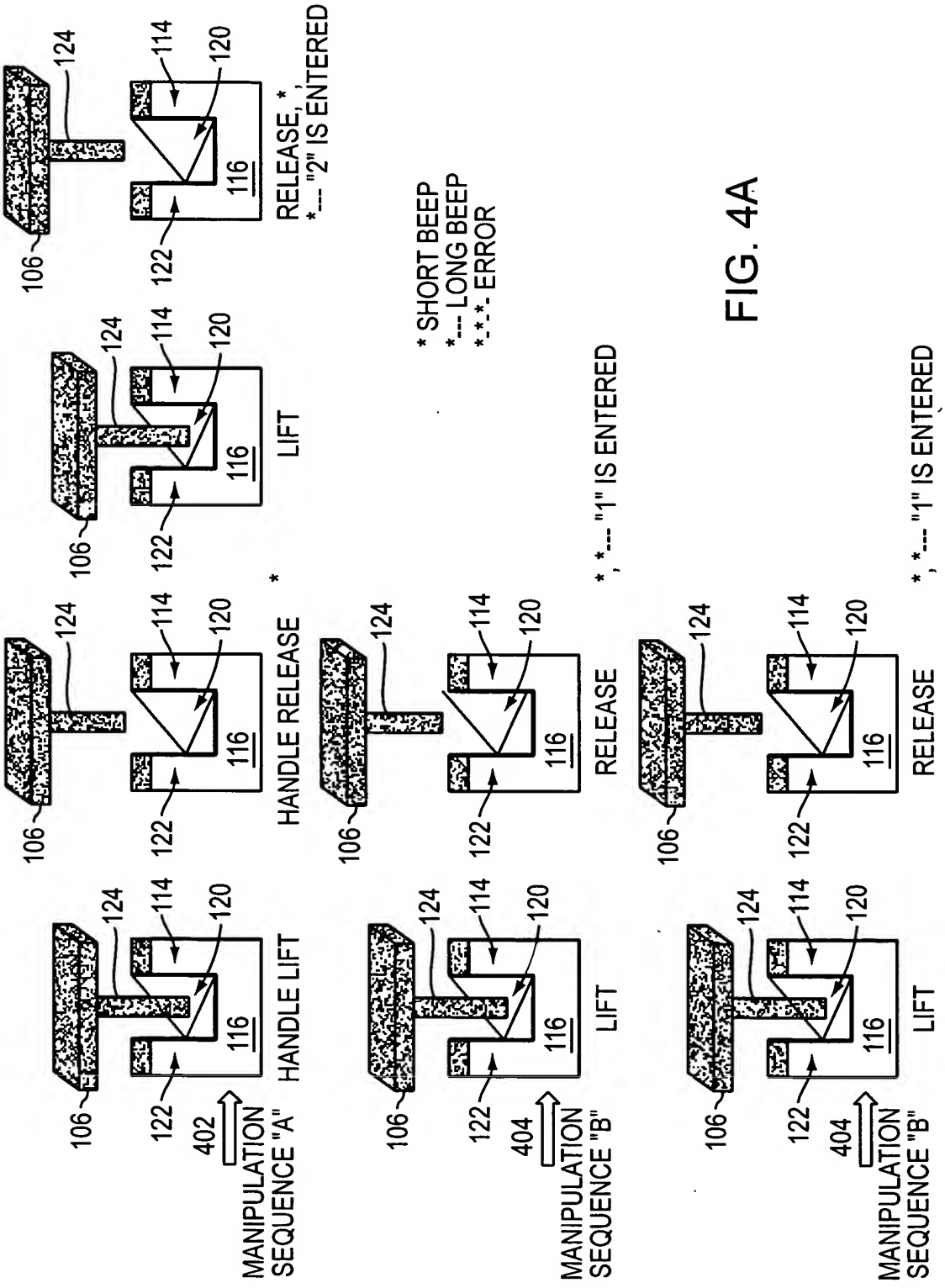
106
124
114
120
116
122
402
404
MANIPULATION SEQUENCE "A"
MANIPULATION SEQUENCE "B"
HANDLE LIFT
LIFT
HANDLE RELEASE
RELEASE
RELEASE, *
*--- "2" IS ENTERED
* SHORT BEEP
*--- LONG BEEP
--*- ERROR
*, *--- "1" IS ENTERED

FIG. 4A

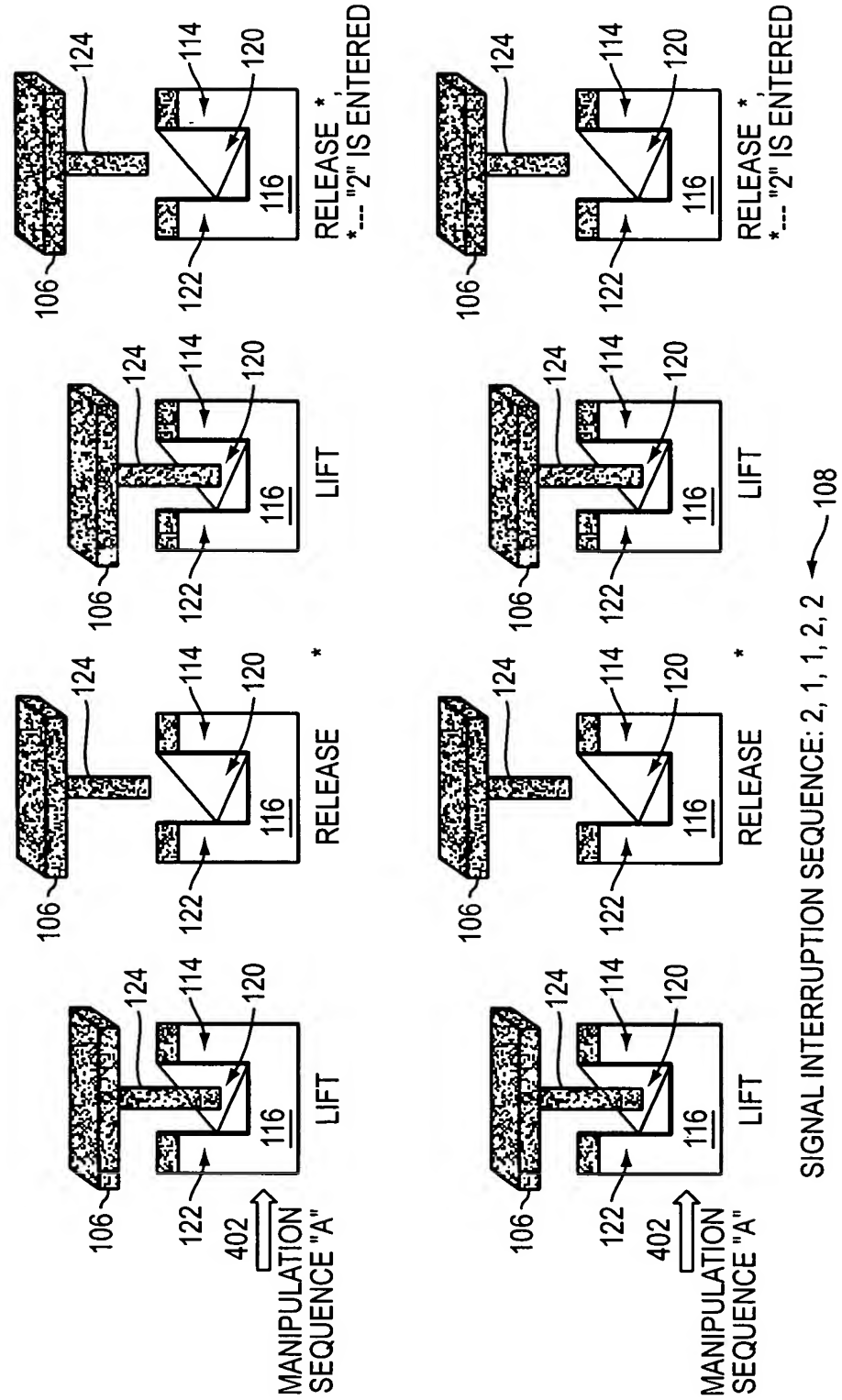
MANIPULATION SEQUENCE "A"
402
LIFT
RELEASE *
LIFT
RELEASE *
*--- "2" IS ENTERED
SIGNAL INTERRUPTION SEQUENCE: 2, 1, 1, 2, 2
108
106
114
116
120
122
124

FIG. 4B

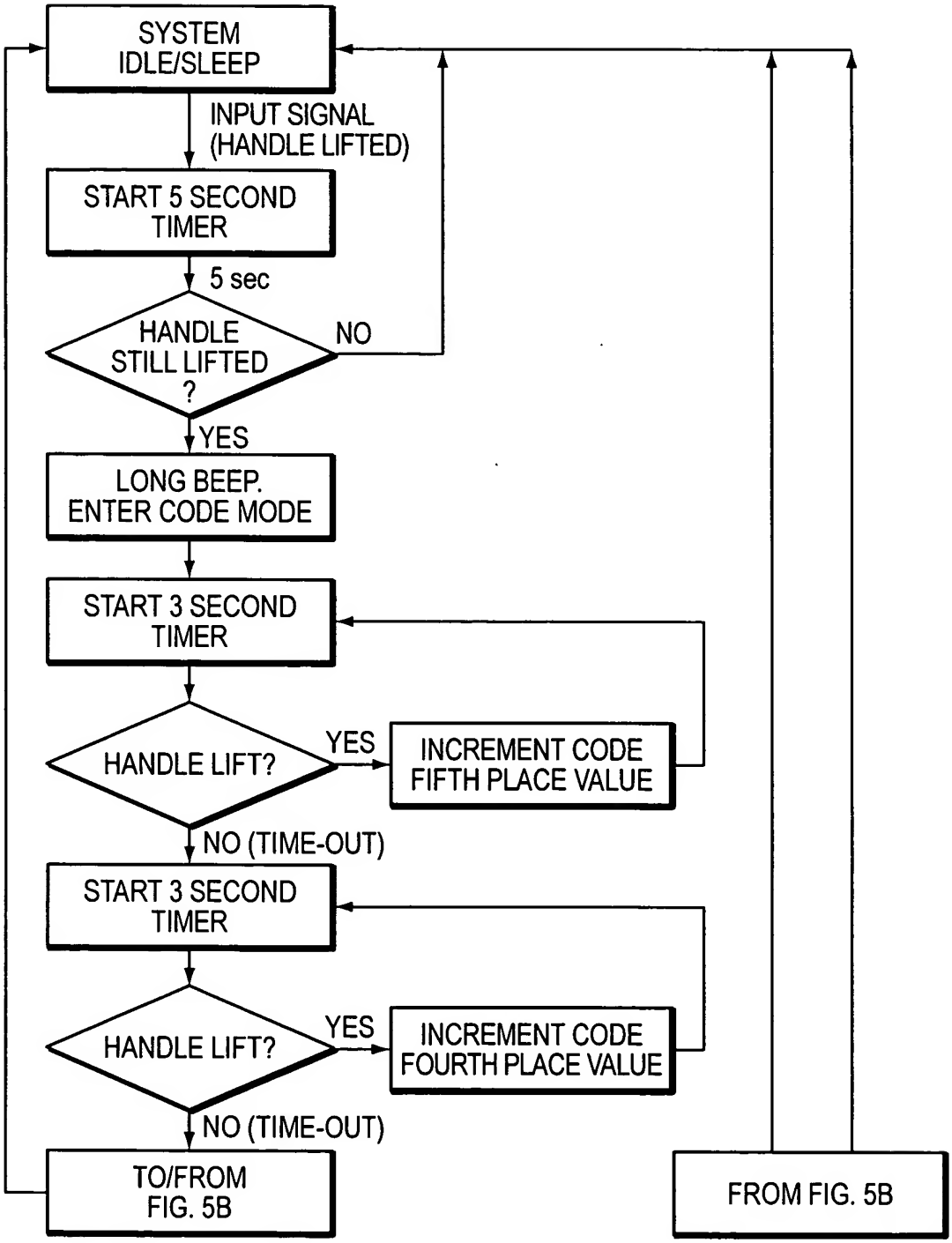
SYSTEM IDLE/SLEEP
INPUT SIGNAL (HANDLE LIFTED)
START 5 SECOND TIMER
5 sec
HANDLE STILL LIFTED ?
NO
YES
LONG BEEP. ENTER CODE MODE
START 3 SECOND TIMER
HANDLE LIFT?
YES
INCREMENT CODE FIFTH PLACE VALUE
NO (TIME-OUT)
START 3 SECOND TIMER
HANDLE LIFT?
YES
INCREMENT CODE FOURTH PLACE VALUE
NO (TIME-OUT)
TO/FROM FIG. 5B
FROM FIG. 5B

FIG. 5A

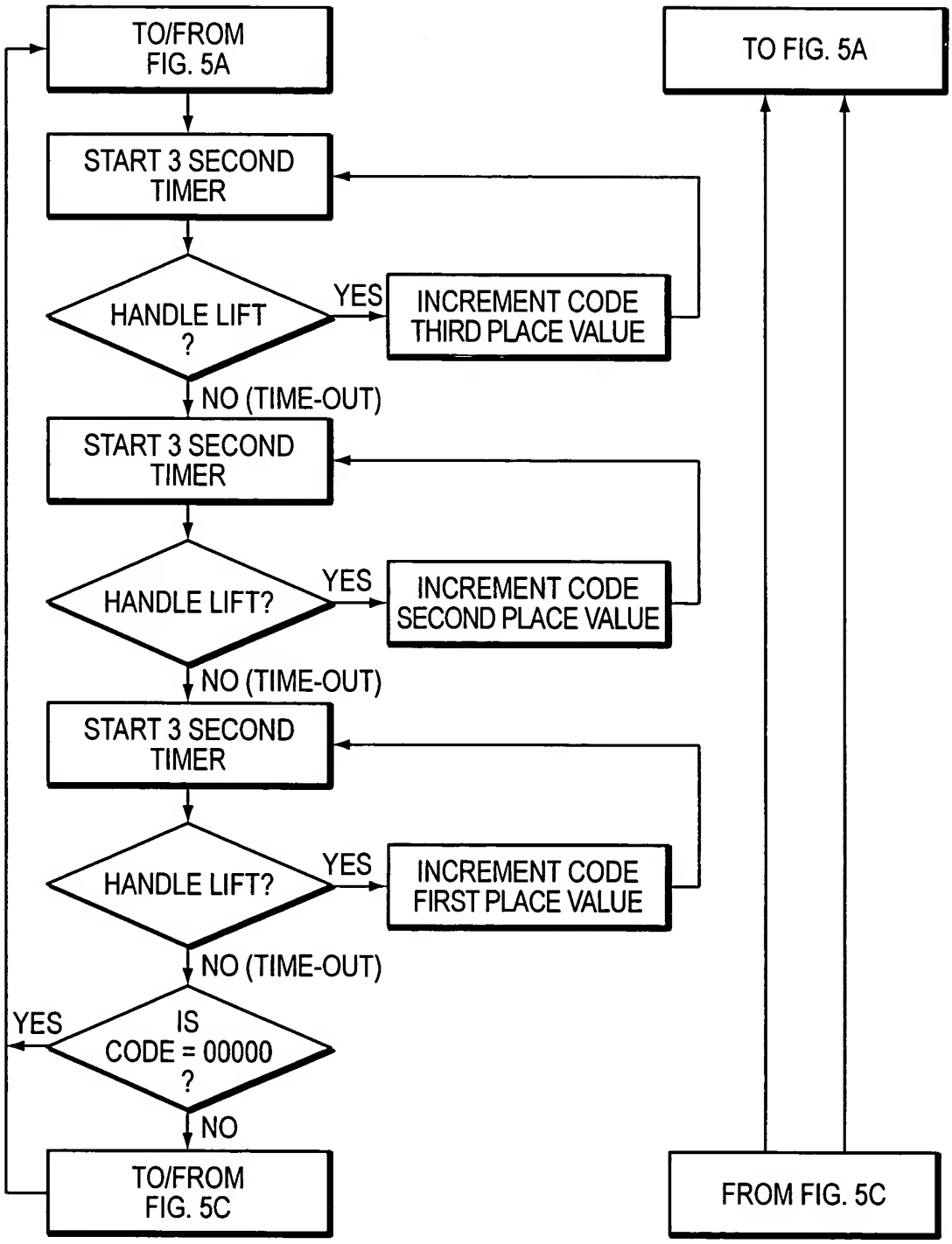
TO/FROM FIG. 5A
START 3 SECOND TIMER
HANDLE LIFT ?
YES
INCREMENT CODE THIRD PLACE VALUE
NO (TIME-OUT)
START 3 SECOND TIMER
HANDLE LIFT?
YES
INCREMENT CODE SECOND PLACE VALUE
NO (TIME-OUT)
START 3 SECOND TIMER
HANDLE LIFT?
YES
INCREMENT CODE FIRST PLACE VALUE
NO (TIME-OUT)
YES
IS CODE = 00000 ?
NO
TO/FROM FIG. 5C
TO FIG. 5A
FROM FIG. 5C

FIG. 5B

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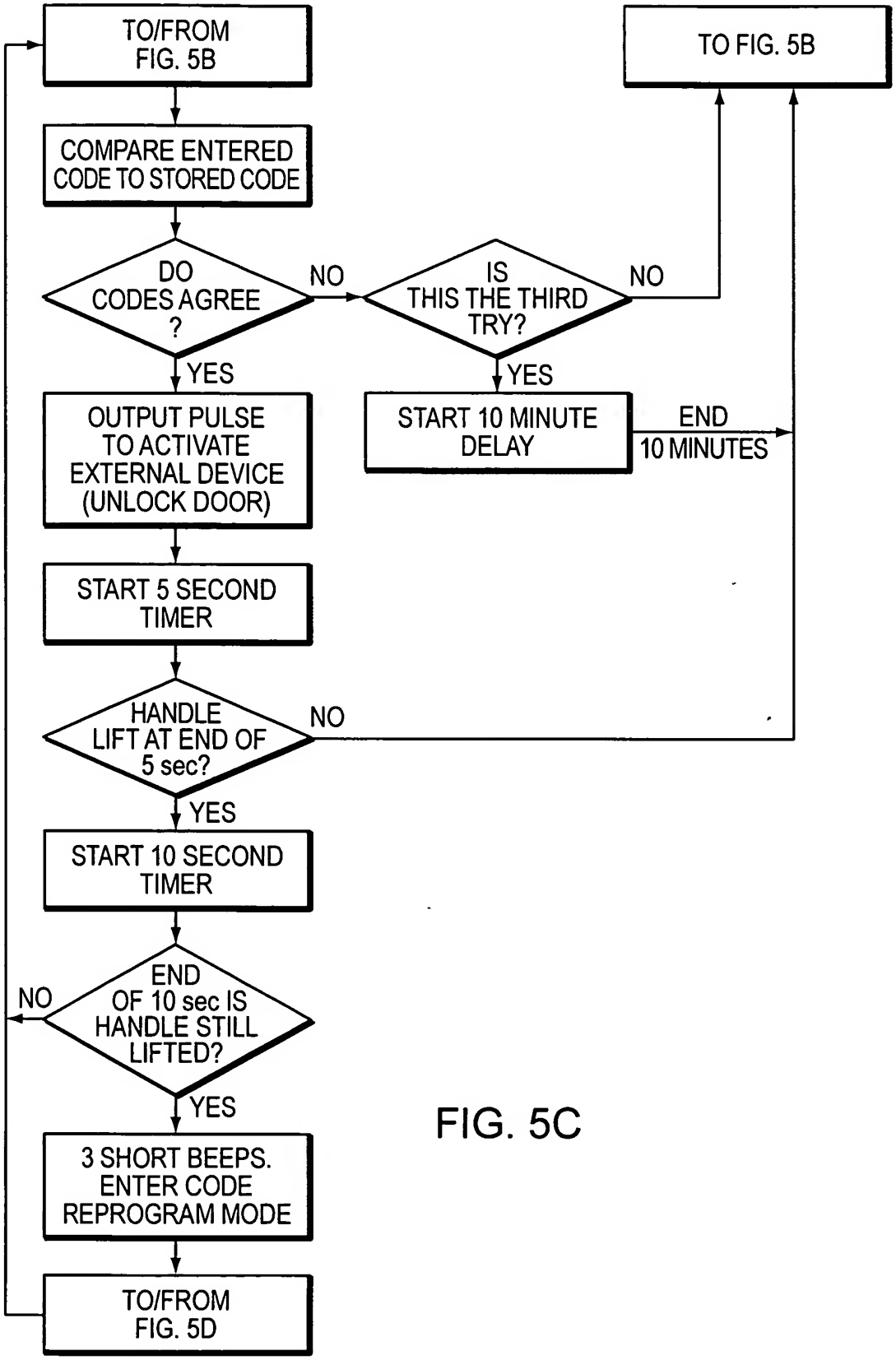

FIG. 5C

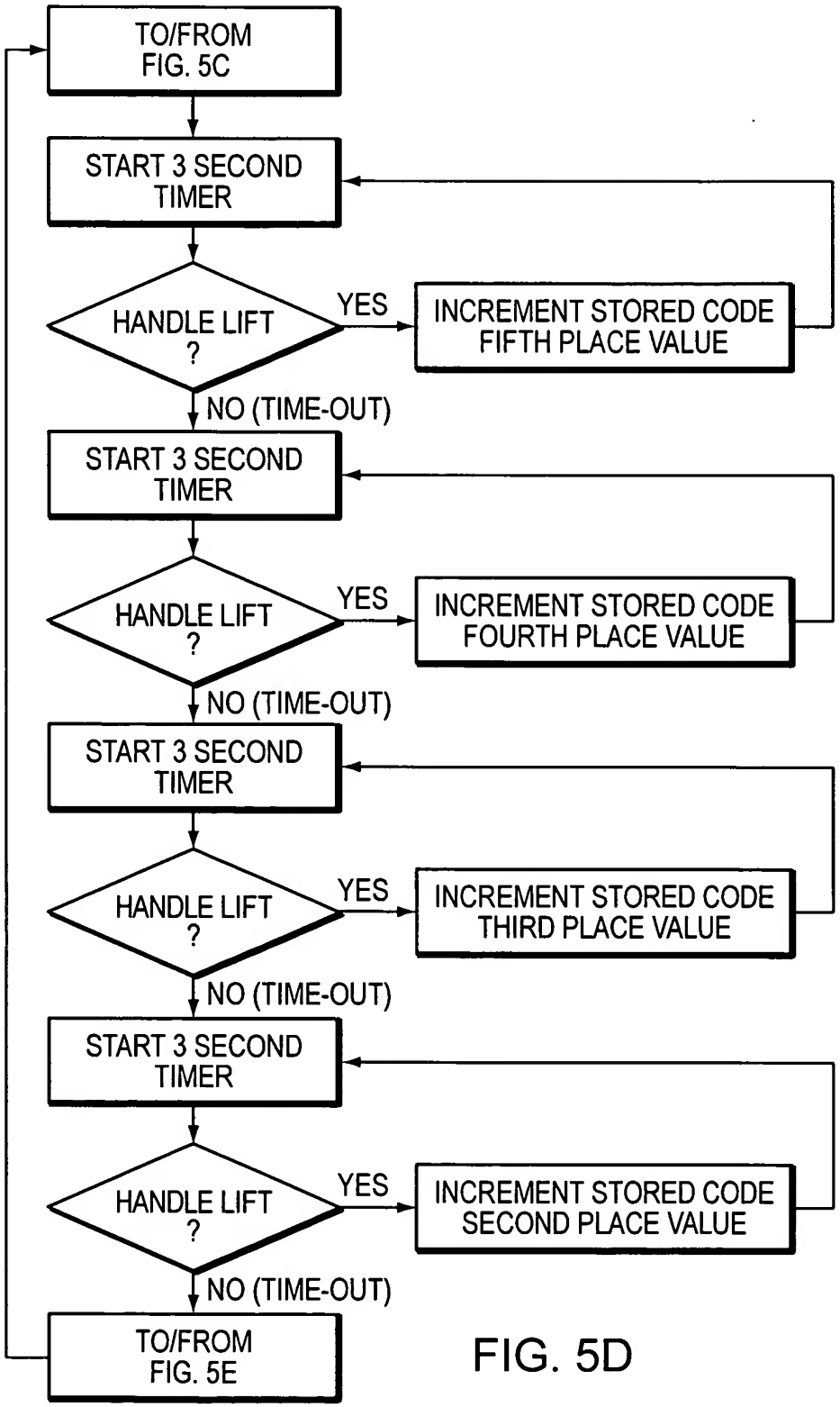
TO/FROM FIG. 5C
START 3 SECOND TIMER
HANDLE LIFT ?
YES
INCREMENT STORED CODE FIFTH PLACE VALUE
NO (TIME-OUT)
START 3 SECOND TIMER
HANDLE LIFT ?
YES
INCREMENT STORED CODE FOURTH PLACE VALUE
NO (TIME-OUT)
START 3 SECOND TIMER
HANDLE LIFT ?
YES
INCREMENT STORED CODE THIRD PLACE VALUE
NO (TIME-OUT)
START 3 SECOND TIMER
HANDLE LIFT ?
YES
INCREMENT STORED CODE SECOND PLACE VALUE
NO (TIME-OUT)
TO/FROM FIG. 5E

FIG. 5D

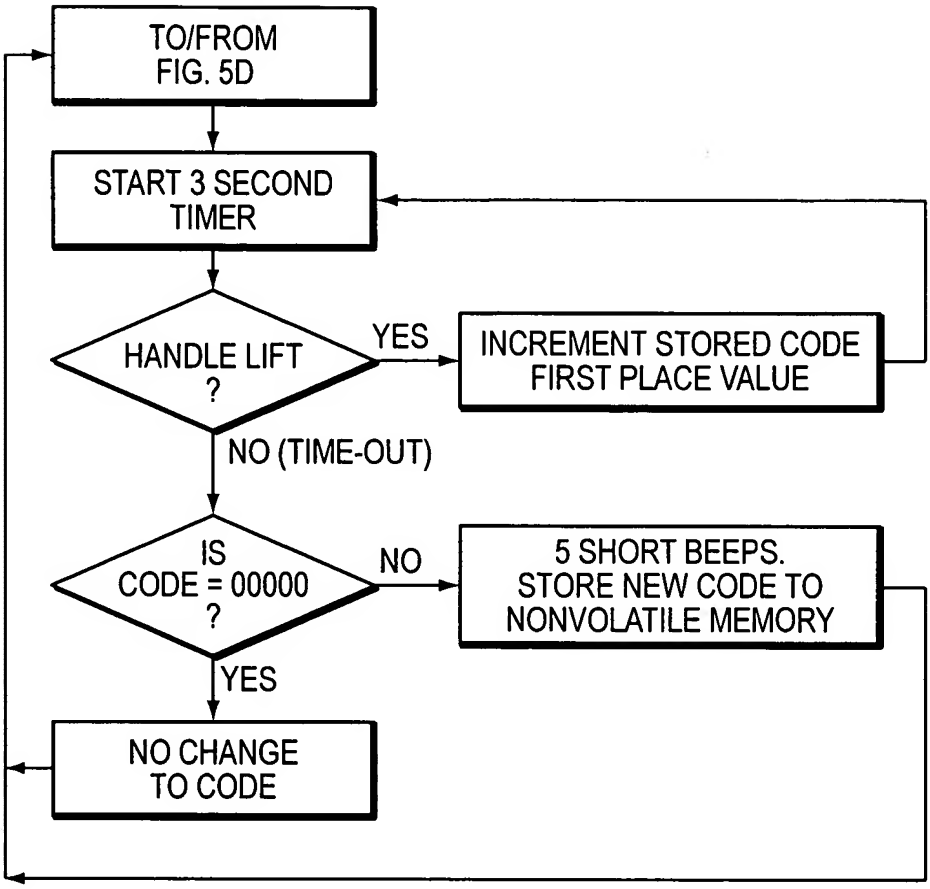
TO/FROM FIG. 5D
START 3 SECOND TIMER
HANDLE LIFT ?
YES
INCREMENT STORED CODE FIRST PLACE VALUE
NO (TIME-OUT)
IS CODE = 00000 ?
NO
5 SHORT BEEPS. STORE NEW CODE TO NONVOLATILE MEMORY
YES
NO CHANGE TO CODE

FIG. 5E

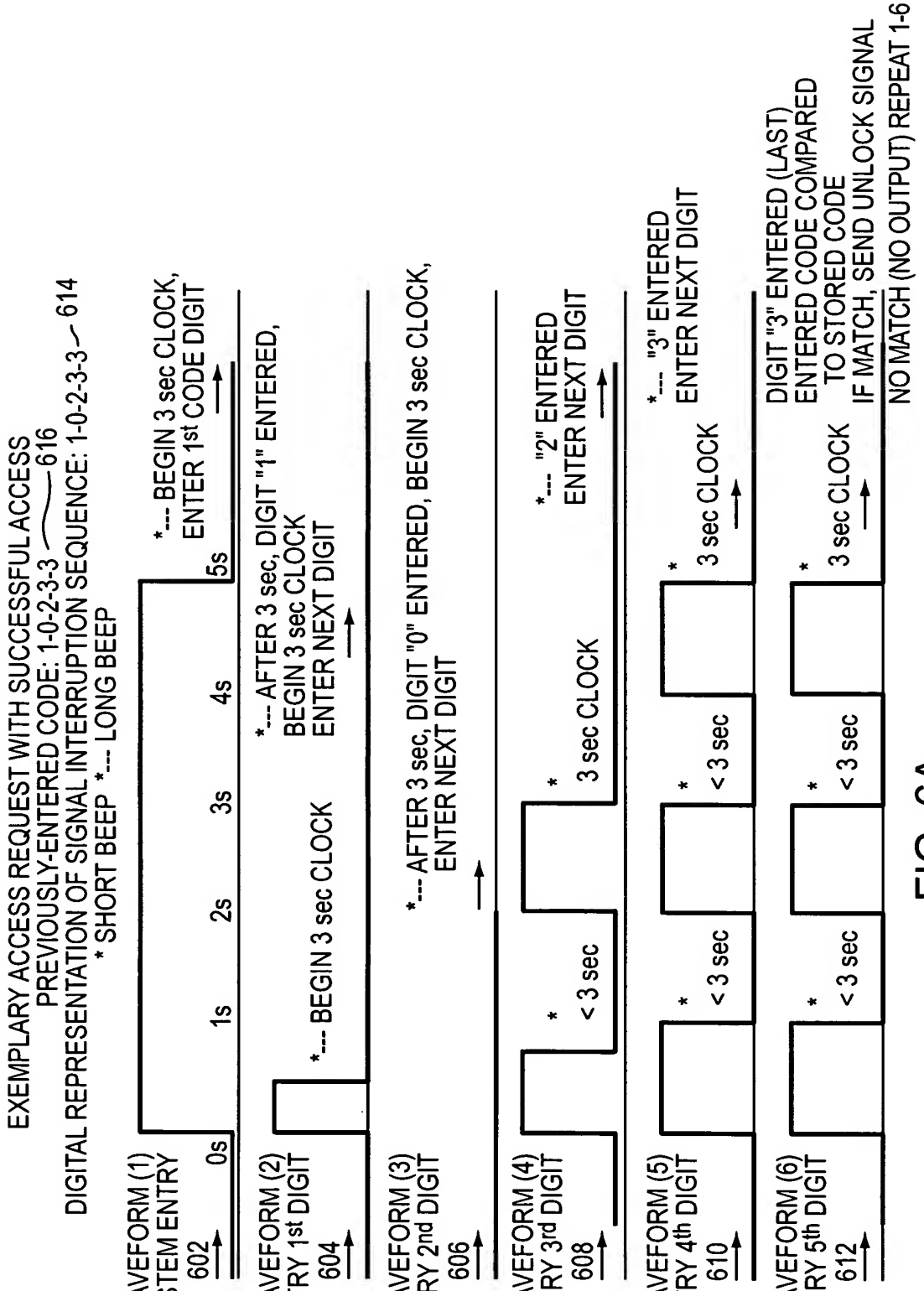
EXEMPLARY ACCESS REQUEST WITH SUCCESSFUL ACCESS
PREVIOUSLY-ENTERED CODE: 1-0-2-3-3 616
DIGITAL REPRESENTATION OF SIGNAL INTERRUPTION SEQUENCE: 1-0-2-3-3 614
* SHORT BEEP *--- LONG BEEP
WAVEFORM (1)
SYSTEM ENTRY
602
0s
1s
2s
3s
4s
5s
*--- BEGIN 3 sec CLOCK, ENTER 1st CODE DIGIT
WAVEFORM (2)
CODE ENTRY 1st DIGIT
604
*--- BEGIN 3 sec CLOCK
*--- AFTER 3 sec, DIGIT "1" ENTERED, BEGIN 3 sec CLOCK ENTER NEXT DIGIT
WAVEFORM (3)
CODE ENTRY 2nd DIGIT
606
*--- AFTER 3 sec, DIGIT "0" ENTERED, BEGIN 3 sec CLOCK, ENTER NEXT DIGIT
WAVEFORM (4)
CODE ENTRY 3rd DIGIT
608
*
< 3 sec
*
3 sec CLOCK
*--- "2" ENTERED ENTER NEXT DIGIT
WAVEFORM (5)
CODE ENTRY 4th DIGIT
610
*
< 3 sec
*
< 3 sec
*
3 sec CLOCK
*--- "3" ENTERED ENTER NEXT DIGIT
WAVEFORM (6)
CODE ENTRY 5th DIGIT
612
*
< 3 sec
*
< 3 sec
*
3 sec CLOCK
DIGIT "3" ENTERED (LAST)
ENTERED CODE COMPARED TO STORED CODE
IF MATCH, SEND UNLOCK SIGNAL
NO MATCH (NO OUTPUT) REPEAT 1-6

FIG. 6A

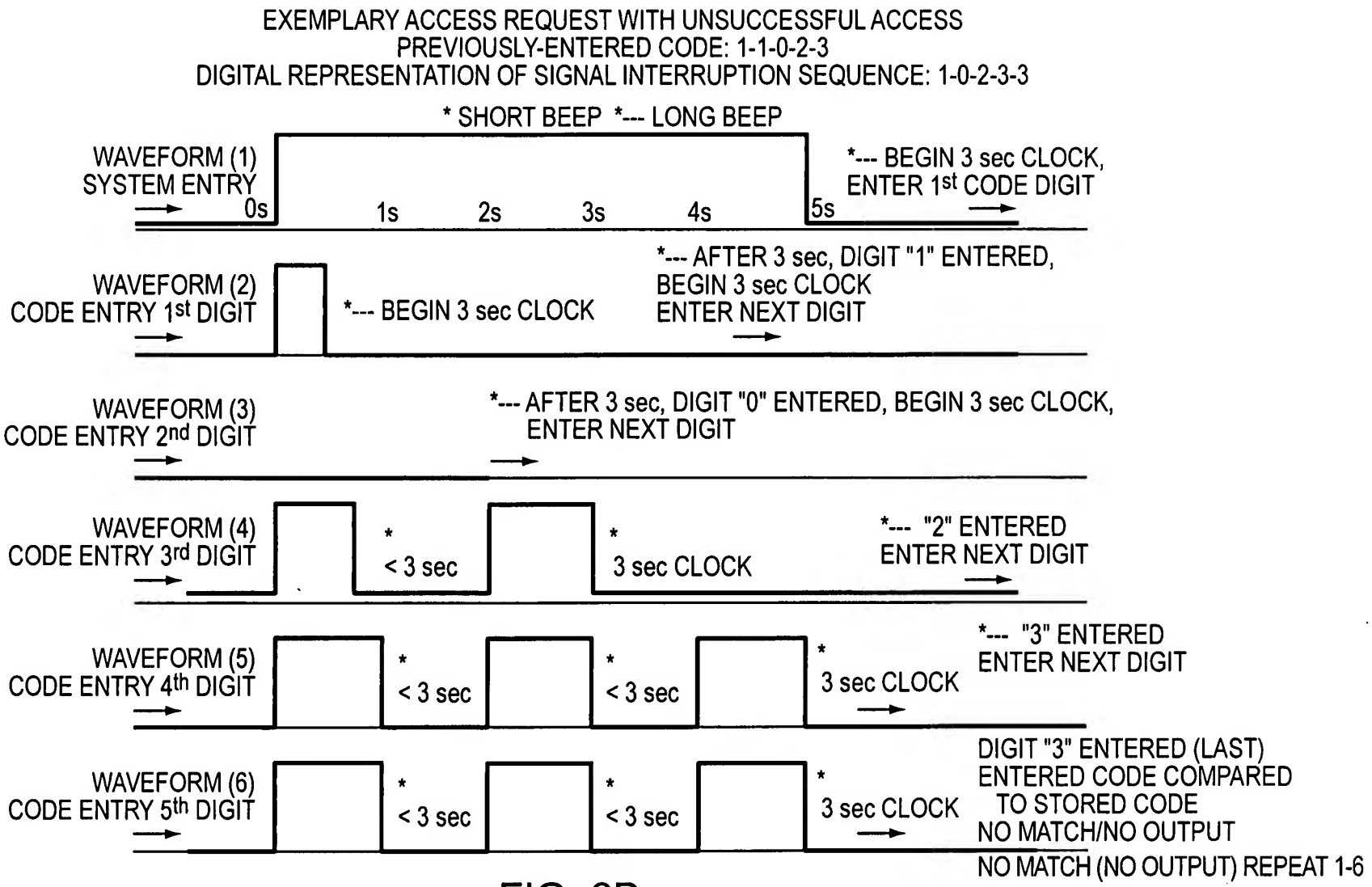

FIG. 6B

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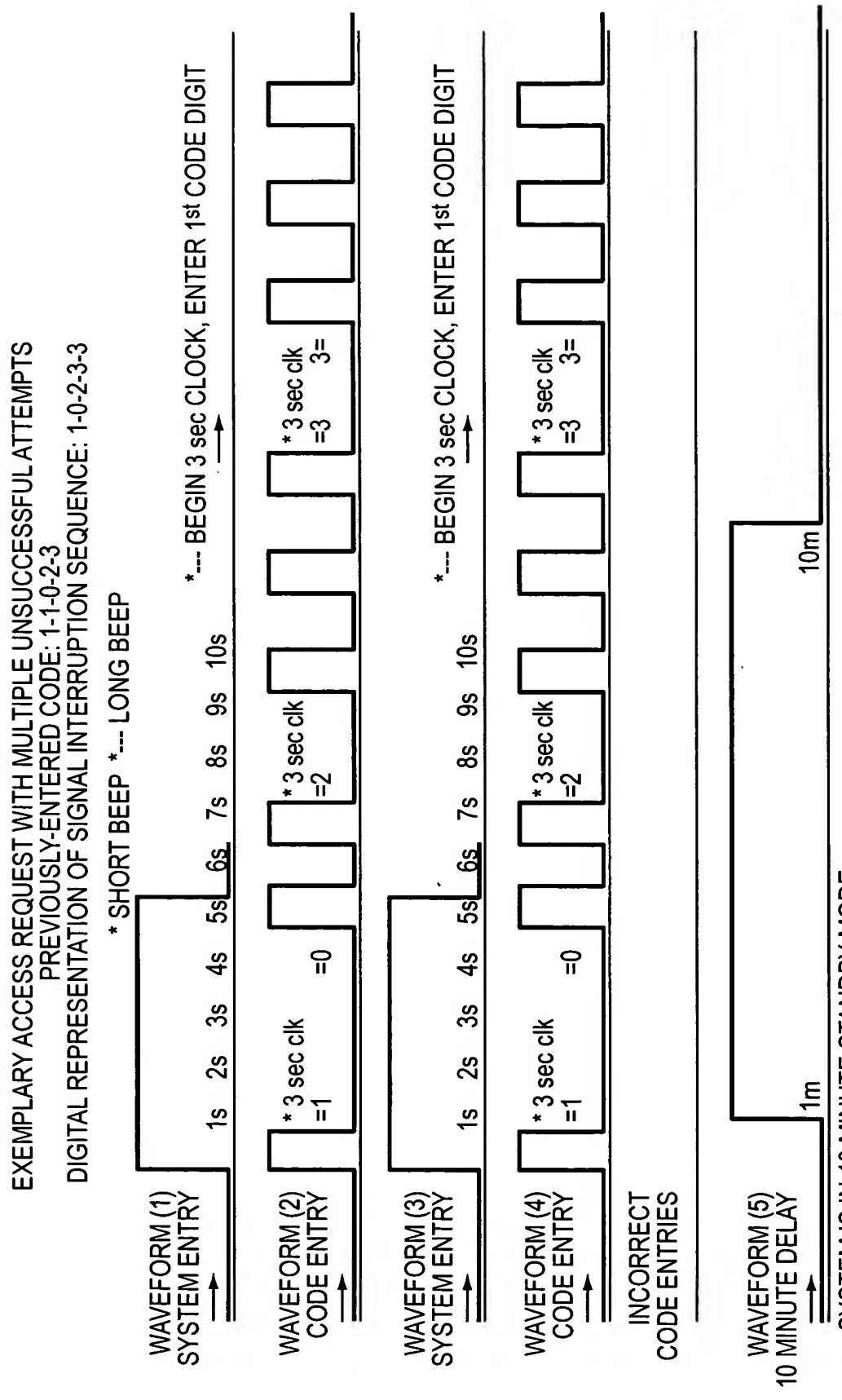

FIG. 6C

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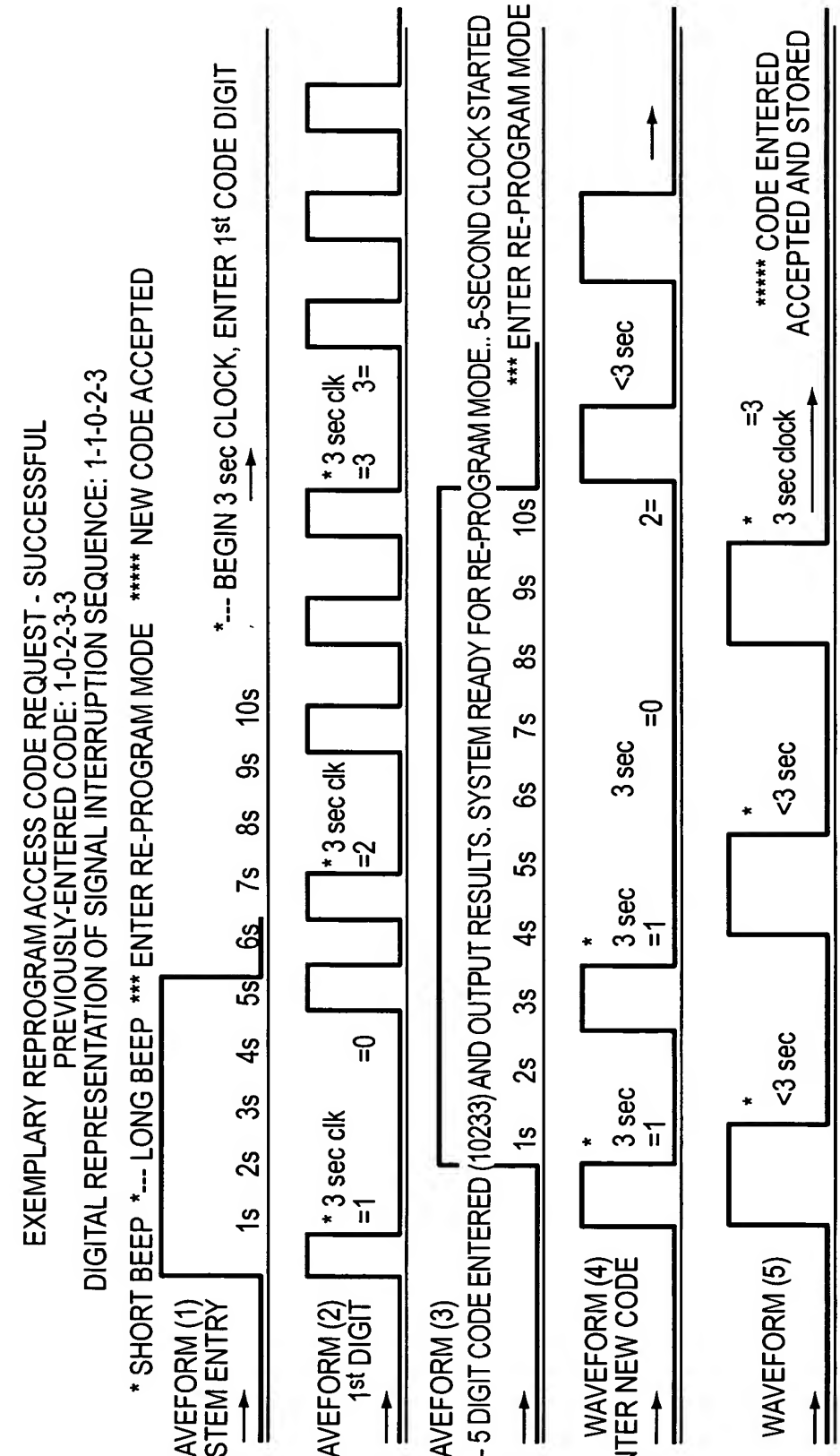

FIG. 6D